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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte KAZUO TESHIROGI, YUZO SHIMOBEPPEU, and
YOSHIAKI SHINJO

Appeal 2008-5896
Application 10/718,653
Technology Center 1700

Decided:¹ February 24, 2009

Before ROMULO H. DELMENDO, MARK NAGUMO, and
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

DELMENDO, *Administrative Patent Judge*.

DECISION ON APPEAL
STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134(a) from a final rejection of claims 1-3, 15, and 18 (Appeal Brief filed January 17, 2008, hereinafter

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the decided date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

“App. Br.”; Final Office Action entered October 17, 2007). Claims 4-14, 16, and 17, the only other pending claims, have been withdrawn from consideration. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

Appellants’ claimed invention is directed to a method of laminating a film on a principal surface of a semiconductor substrate by using, in the manner claimed, a rotatable roller having a diameter of about 20-50 mm, a heat-generating part therein, and an elastically deformable resin layer on an outer surface thereof (Claim 1).

Claims 1 and 15, the only independent claims on appeal, read as follows:

1. A film lamination method for laminating a film on a principal surface of a semiconductor substrate by using a rotatable roller having a diameter of about 20-50mm, a heat-generating part therein and an elastically deformable resin layer on an outer surface thereof, the film lamination method comprising:

pressing the roller onto the film placed on the principal surface of the semiconductor substrate while generating heat by the heat-generating part;

rolling the roller on the film so as to laminate the film on the semiconductor substrate by heat only from the heat-generating part while absorbing unevenness of the outer surface of the roller and unevenness of a surface of the film by elastic deformation of the elastically deformable resin layer;

wherein said roller presses the film with a pressing load of 10-20N;

wherein the heat-generating part is heated to about 200°C; and about 5 seconds after the roller is pressed to an area of the principal surface of the semiconductor substrate said area returns to a temperature about equal to the area’s temperature prior to contact with the roller.

15. A manufacturing method of a semiconductor device, comprising the steps of:

grinding another principal surface of the semiconductor substrate so as to thin the semiconductor substrate;

applying an attachment film onto the another principal surface of the semiconductor substrate; and

individualizing the semiconductor substrate into a plurality of semiconductor elements,

wherein the attachment film is laminated on the semiconductor substrate by pressing the attachment film placed on the another principal surface of the semiconductor substrate by a rotatable roller having a diameter of about 20-50mm, a heat-generating part therein and an elastically deformable resin layer on an outer surface thereof, and rolling the roller on the attachment film while generating heat by only the heat-generating part while absorbing unevenness of the outer surface of the roller and unevenness of a surface of the film by elastic deformation of the elastically deformable resin layer;

wherein said roller presses the film with a pressing load of 10-20N;

wherein the heat-generating part is heated to about 200°C; and

about 5 seconds after the roller is pressed to an area of the principal surface of the semiconductor substrate said area returns to a temperature about equal to the area's temperature prior to contact with the roller.

The prior art references relied upon by the Examiner to reject the claims on appeal are:

Da Costa	3,040,489	Jun. 26, 1962
Pool	3,501,128	Mar. 17, 1970
Shoffner	3,749,621	Jul. 31, 1973
Tsunashima	5,051,475	Sep. 24, 1991
Homma	5,336,703	Aug. 9, 1994
Nagatomi ²	JP 54124968	Sep. 28, 1979

² The Examiner relied on both the English language translation of Nagatomi as prepared by Schreiber Translations, Inc. (PTO 08-3752) and the abstract

Appellants' admitted prior art (Spec. 1-3).

The Examiner rejected claims 1-3 and 18 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Nagatomi, either one of Inada or Shoffner, Da Costa, either one of Tsunashima or Homma, and optionally Pool (Examiner's Answer mailed on March 27, 2008, hereinafter "Ans.," 3). Also, the Examiner rejected claim 15 under 35 U.S.C. § 103(a) as unpatentable over the combined teachings of Nagatomi, either one of Inada or Shoffner, Da Costa, either one of Tsunashima or Homma, optionally Pool, and Appellants' admitted prior art (Ans. 7).

ISSUE

The dispute in this appeal centers on the limitation specifying an "elastically deformable resin layer on an outer surface" of the rotatable roller used in the claimed film lamination method. The Examiner found that Nagatomi teaches a method for laminating an adhesive film on a surface of a semiconductor substrate using a roller having a heat-generating part. (Ans. 3-4). The Examiner acknowledged, however, that Nagatomi does not teach

of the same patent document retrieved from the EAST database (Ans. 3; Office Action, Search Notes, PTO-892, and "NPL Documents" entered April 17, 2006).

³ As with Nagatomi, the Examiner relied on both the English language translation of Inada as prepared by Schreiber Translations, Inc. (PTO 08-3769) and the abstract retrieved from the EAST Database (Ans. 3; Office Action, Search Notes, PTO-892, and "NPL Documents" entered April 17, 2006). Though the translation identifies the inventors as Inada et al., the Examiner, Appellants, and the EAST database abstract identify the reference as "Inada." For consistency, we will also refer to the document as "Inada."

the roller having an elastically deformable resin layer on an outer surface (*Id.* 4. ll. 2-4). In an attempt to account for this difference, the Examiner relied on both Inada and Shoffner, which the Examiner found teach a TEFLON® layer on a roller (*Id.* 4, ll. 4-11). Furthermore, the Examiner found that Pool shows that it was well known in the art that TEFLON® is elastically deformable (*Id.* 5, ll. 6-7). The Examiner then concluded that it would have been obvious to one of ordinary skill in the art to combine the teachings of either Inada or Shoffner with the teachings of Nagatomi to obtain a roller having an elastically deformable resin layer on its surface “to laminate the adhesive film without the adhesive film sticking to the roller and the roller being resistant to corrosion” (*Id.* 4, ll. 14-15).

Appellants counter, *inter alia*, that Inada and Shoffner are directed to making a so-called “TAB tape” and “securing and/or forming of coverings of fluorinated ethylene polymer (FEP) materials,” respectively—art unrelated to the present invention (and Nagatomi) (App. Br. 8). Appellants conclude that the Examiner provided no reason why the skilled artisan would have combined the references to arrive at the claimed invention (*Id.* 8-10).

Thus, the dispositive issue arising from the contentions of the Examiner and Appellants is:

Have Appellants shown that the Examiner erred in determining that one of ordinary skill in the art would have had a reason to use a roller having a TEFLON® layer surface, as taught by either Inada or Shoffner, in place of Nagatomi’s roller to obtain the claimed rotatable roller having “an elastically deformable resin layer on an outer surface thereof” as recited in claims 1 and 15, the only independent claims on appeal.

FINDINGS OF FACT (FF)

Findings of Fact throughout this Opinion are supported by a preponderance of the evidence of record.

1. Nagatomi teaches a method of manufacturing a semiconductor including: contacting a face of a semiconductor substrate with an adhesive sheet, the degree of adhesion of which may be changed by heat; thermo-compression bonding the sheet using a heated element in the form of a roller; carving scribe lines on one principal plane of the semiconductor substrate; and then splitting by applying a partial pressure so that individual semiconductor devices are formed (Nagatomi at 4, ll. 3-6; 4, l. 18 to 5, l. 1; Figures 1 and 2).
2. Nagatomi does not teach that the surface of the roller may be elastically deformable.
3. Nagatomi discloses that the objectives of the disclosed method are to: (1) obtain uniform adhesion through uniform heating; (2) prevent foams from generating on the adhered surface; and (3) prevent excessive adhesion between the adhesive sheet and semiconductor substrate (Nagatomi at 7-8).
4. Inada discloses a method of making a so-called “TAB tape” by adhering a metal film to the central area of an insulator tape (e.g., polyimide tape) entirely coated with an adhesive on its upper surface and pressing the metal film with a thermal-press adhesion roller having a TEFLON[®] or silicone surface (¶¶ 0007 and 0008).
5. Inada does not describe adhering films to semiconductor substrates.

6. Inada states that the film surface of the roller functions to prevent excessive adhesive, which is pressed out from under the metal film, from adhering to the roller (¶¶ 0008 and 0010).
7. Shoffner discloses methods of securing fluorocarbon thermoplastic materials such as TEFLON® FEP (fluorinated ethylene polymer) resins to substrates, e.g., process rollers (col. 2, ll. 9-22).
8. Shoffner does not describe adhering films to semiconductor substrates.
9. Shoffner discloses that a TEFLON® coated roller provides “chemical inertness, freedom from adhesion to other substances, and resistance to corrosion” (col. 1, ll. 46-50).
10. Pool states that TEFLON® is regarded as “elastically deformable” without disclosing the conditions used to determine this property (col. 3, ll. 33-35).
11. Appellants’ invention pertains to the field of methods of “laminating a die-attachment film, such as a die-attachment sheet material or a fixation film, onto a backside of a semiconductor substrate” (Spec. 1, ll. 7-14).
12. Appellants’ Specification states that the elastically deformable resin layer on the outer surface of the roller “absorb[s]” unevenness, thus facilitating lamination “without generation of air bubbles or wrinkles” (Spec. 9, ll. 31-37).
13. With specific reference to a “fluoride resin layer,” Appellants’ Specification states that “separability between the pressing roller . . . and a die-attachment film can be improved” (Spec. 15, ll. 29-33).

14. The Examiner did not rely on any evidence or reasoning other than those based on Inada, Shoffner, and Pool to account for the limitation specifying the elastically deformable resin layer on the outer surface of the roller.

PRINCIPLES OF LAW

“Section 103 forbids issuance of a patent when ‘the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.’” *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734 (2007) (quoting 35 U.S.C. § 103(a)).

“Although § 103 does not, by its terms, define the ‘art to which [the] subject matter [sought to be patented] pertains,’ this determination is frequently couched in terms of whether the art is analogous or not, *i.e.*, whether the art is ‘too remote to be treated as prior art.’” *In re Clay*, 966 F.2d 656, 658 (Fed. Cir. 1992) (quoting 35 U.S.C. § 103(a), first occurrence and *In re Sovish*, 769 F.2d 738, 741 (Fed. Cir. 1985), second occurrence).

“Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.” *Clay*, 966 F.2d at 658-659.

ANALYSIS

The Examiner finds that Nagatomi differs from the claimed invention in that it does not disclose the recited “elastically deformable resin layer on an outer surface” of the rotatable roller (Ans. 4; FF 1 and 2). Relying on Inada and Shoffner (FF 4, 6, 7, and 9), the Examiner concludes that “[i]t would have been obvious to one of ordinary skill in the art . . . to use as the cylindrical roller taught by Nagatomi et al. the metal cylindrical roller with an outer fluoride resin layer as shown by either one of Inada et al. or Shoffner to laminate the adhesive film without the adhesive film sticking to the roller and the roller being resistant to corrosion” (Ans. 4, ll. 11-15).

The question Appellants present is whether the Examiner erred in concluding obviousness based on the teachings of Nagatomi, combined with either Inada or Shoffner. References are not pertinent in an obviousness determination if they are not from “analogous art.” *Clay*, 966 F.2d at 658. A reference is analogous art if: (1) the reference is from the same field of endeavor, regardless of the problem addressed; or (2) the reference is reasonably pertinent to the particular problem concerned by the inventor. *Id.*

Appellants do not deny that Nagatomi is in the same field of endeavor—the application of films to semiconductor substrates—as the claimed invention.

Inada and Shoffner, however, are not within the same field of endeavor as Appellants’ invention (or, for that matter, Nagatomi). While Inada teaches that TEFLON® or silicone prevents excessive adhesive that is pressed out from adhering to a roller, this teaching is in the context of a method of making a so-called “TAB tape” (FF 4 and 6). Shoffner teaches methods of securing TEFLON® FEP resins as coverings for substrates and states that a TEFLON® coated roller provides “chemical inertness, freedom

from adhesion to other substances, and resistance to corrosion" (FF 7 and 9). But the Examiner has not indicated any disclosure in either Inada or Shoffner concerning the type of semiconductor processing described by Nagatomi or Appellants' Specification. Unlike the fields of endeavor with which Inada and Shoffner are concerned, Nagatomi and Appellants' invention pertain to the field of methods of laminating a sheet or film onto a semiconductor substrate (FF 1 and 11).

Though from different fields of endeavor, the references could be properly combined with Nagatomi if they were reasonably pertinent to some problem addressed by Appellants' Specification or Nagatomi's disclosure. In Appellants' invention, the "elastically deformable resin layer on an outer surface" of the rotatable roller performs the functions of "absorb[ing]" unevenness, thus facilitating lamination "without generation of air bubbles or wrinkles" (FF 12) and, with specific reference to fluoride resins, to facilitate "separability between the pressing roller . . . and a die-attachment film" (FF 13), thus preferentially adhering a die attachment film onto a semiconductor substrate rather than to the heated roller. Nagatomi discloses that the objectives are to: (1) obtain a uniform adhesion by uniform heating; (2) prevent foams from generating on the adhered surface; and (3) prevent excessive adhesion between the adhesive sheet and semiconductor substrate (FF 3). However, Inada's TEFLON[®] coated roller prevents excessive adhesive, which is pressed out from under a metal film pressed against adhesive coated insulator tape, from adhering to the roller (FF 4 and 6). In contrast, neither Appellants' Specification nor Nagatomi has been shown to be concerned with the problem with which Inada is concerned. Also, Shoffner's TEFLON[®] coated roller is said to provide "chemical resistance,

freedom from adhesion to other substances, and resistance to corrosion" (FF 9). Again, the Examiner has not shown that Appellants' Specification or Nagatomi describes such problems arising in the disclosed laminating process (FF 3, 12, and 13). Therefore, the purposes of Inada and Shoffner for using the "elastically deformable resin layer on an outer surface" of the rotatable roller are plainly different from the particular purposes addressed in Nagatomi or Appellants' Specification. In this case, the Examiner did not direct us to persuasive evidence or other acceptable reasoning to establish that the specific problems addressed by Inada or Shoffner would even be concerns in the context of Appellants' (or Nagatomi's) method. Furthermore, the Examiner has not shown that Nagatomi suggests that any of the problems Appellants are concerned with could be addressed using the TEFLON® coated rollers disclosed by Inada or Shoffner. Hence, the Examiner did not satisfactorily establish that the teachings of Inada or Shoffner would have logically commended themselves to the attention of a person having ordinary skill in the art in considering the problems addressed by the present Specification or Nagatomi.

For these reasons, the Examiner has not made out a *prima facie* case that a person having ordinary skill in the art would have been led to combine the teachings of Nagatomi with Inada and Shoffner in the manner claimed.

We need not address the teachings of the other references because the Examiner has not relied on them to account for the difference between Nagatomi and the claimed invention in terms of the "elastically deformable resin layer on an outer surface" of the rotatable roller.

CONCLUSION

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The Examiner erred in concluding that one of ordinary skill in the art would have had a reason to modify Nagatomi by replacing the roller described therein with a roller having a TEFLO[®] layer surface, as taught by either Inada or Shoffner.

ORDER

The decision of the Examiner rejecting claims 1-3, 15, and 18 is reversed.

REVERSED

ack

cc :

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